CLAIMS

What is claimed is:

1. A system, comprising:

an electronic device that is operable to establish estimated values of a plurality of electrical parameters of an electric motor based on electrical input data obtained at a single load of the electric motor.

2. The system as recited in claim 1, wherein the electronic device is operable to establish an estimated value of an operating parameter of the electric motor based on the estimated values of electrical parameters of the electric motor.

3. The system as recited in claim 2, wherein the operating parameter is motor torque.

4. The system as recited in claim 2, wherein the operating parameter is motor efficiency.

5. The system as recited in claim 1, wherein the operating parameter is rotor temperature.

6. The system as recited in claim 1, wherein the plurality of electrical parameters of the electric motor comprises electrical resistance of the rotor during operation of the electric motor.

7. The system as recited in claim 1, wherein the plurality of electrical parameters of the electric motor comprises stator inductance.

8. The system as recited in claim 1, wherein the electrical input data comprises input voltage, input current, and input frequency.

9. The system as recited in claim 8, wherein the electrical input data comprises motor temperature and motor speed.

10. The system as recited in claim 8, wherein the electrical input data comprises input power.

11. The system as recited in claim 8, wherein the electronic device is operable to establish input power from the input current and the input voltage.

12. The system as recited in claim 1, comprising a visual display operable to provide a visual indication of at least one of the estimated values of a plurality of electrical parameters and the estimated valve of an operating parameter.

13. The system as recited in claim 1, comprising a communication module operable to enable data to be manually provided to the system.

14. The system as recited in claim 1, wherein the electronic device is coupleable to an external communications network.

15. An electric motor system, comprising:

an electronic device that is operable to establish an estimated value of an operating parameter of an electric motor based on electrical input data obtained at first, second, and third loads of the electric motor.

16. The system as recited in claim 15, wherein the electronic device comprises a data processing module adapted to estimate the operating parameter without a measurement of stator resistance of the electric motor.

17. The system as recited in claim 15, wherein the operating parameter comprises motor efficiency.

18. The system as recited in claim 15, wherein the operating parameter comprises motor torque.

19. The system as recited in claim 15, wherein the operating parameter comprises motor output power.

20. The system as recited in claim 15, wherein the operating parameter comprises rotor temperature.

21. The system as recited in claim 15, wherein the electrical input data comprises input voltage, input current, and speed of the electric motor.

22. The system as recited in claim 21, wherein the electrical input data comprises motor temperature and frequency of the electric motor.

23. The system as recited in claim 22, wherein the electrical input data comprises input power of the electric motor.

24. The system as recited in claim 22, wherein the electronic device is operable to establish input power of the electric motor.

25. A system, comprising:

an electronic device that is operable to establish estimated values of a plurality of electrical parameters of an inverter-driven electric motor based on baseline motor parameters and based on electrical input data obtained at a desired operating condition of the inverter-driven electric motor, wherein baseline motor parameters comprise a first motor frequency and the desired operating condition comprises a second motor frequency.

26. The system as recited in claim 25, wherein the electronic device is operable to establish an estimated value of at least one operating parameter of the inverter-driven electric motor based on the estimated values.

27. The system as recited in claim 25, wherein the baseline motor parameters comprise define an equivalent circuit of the inverter-driven electric motor.

28. The system as recited in claim 25, wherein the first motor frequency is approximately 60 Hertz.

29. The system as recited in claim 25, wherein the electronic device comprises a motor estimation module adapted to establish a core loss resistance at the desired operating condition based at least partially on a change in motor frequency.

30. The system as recited in claim 25, wherein the electrical input data comprises input voltage, input current, input frequency, and temperature.

31. The system as recited in claim 25, comprising a visual display and a keyboard.

32. A system comprising:

means for obtaining electrical parameters of an electric motor based on electrical input data of the electric motor; and

means for estimating at least one operating parameter of the electrical motor based at least partially on the means for obtaining electrical parameters.

33. The system as recited in claim 32, wherein the means for obtaining electrical parameters comprises means for estimating at least one of the electrical parameters based at least partially on motor parameters measured at a single load point of the electric motor.

34. The system as recited in claim 32, wherein the means for obtaining electrical parameters comprises means for estimating at least one of the electrical parameters based at least partially on motor parameters measured at three load points of the electric motor.

35. The system as recited in claim 32, wherein the means for obtaining electrical parameters comprises means for estimating at least one of the electrical parameters based at least partially on baseline motor parameters and motor parameters measured at a desired operating load point of the electric motor.

36. The system as recited in claim 32, wherein the means for estimating at least one operating parameter comprises means for estimating operating efficiency of the electric motor.

37. The system as recited in claim 32, wherein the means for estimating at least one operating parameter comprises means for estimating output power of the electric motor.

38. The system as recited in claim 32, wherein the means for estimating at least one operating parameter comprises means for estimating torque of the electric motor.

39. The system as recited in claim 32, wherein the means for estimating at least one operating parameter comprises means for estimating rotor temperature of the electric motor.

40. The system as recited in claim 32, wherein the means for estimating at least one operating parameter comprises means for estimating performance of the electric motor.

41. A program for analyzing an electric motor, comprising:

a machine readable medium;

a motor estimation module stored on the machine readable medium and adapted to establish estimated values of a plurality of electrical parameters of the electric motor based at least partially on measured motor parameters.

42. The program as recited in claim 41, wherein the motor estimation module comprises a single load point motor estimation module adapted to estimate the plurality of electrical parameters based on motor measurements at a single load of the electric motor.

43. The program as recited in claim 41, wherein the motor estimation module comprises a three load point motor estimation module adapted to estimate the plurality of electrical parameters based on motor measurements at first, second, and third loads of the electric motor.

44. The program as recited in claim 41, wherein the motor estimation module comprises a baseline and load point motor estimation module adapted to estimate the plurality of electrical parameters based on baseline motor parameters and motor measurements at a desired operating load of the electric motor, wherein the baseline motor parameters comprise a first motor frequency and the desired operating load comprises a second motor frequency different from the first motor frequency.

45. The program as recited in claim 41, wherein the motor estimation module is adapted to estimate an operating parameter of the electric motor based at least partially on the estimated values.

46. The program as recited in claim 45, wherein the operating parameter comprises efficiency of the electric motor.

47. The program as recited in claim 45, wherein the operating parameter comprises torque of the electric motor.

48. The program as recited in claim 45, wherein the operating parameter comprises power output of the electric motor.

49. The program as recited in claim 45, wherein the operating parameter comprises rotor temperature of the electric motor.

50. A motor analysis device, comprising:

a data processing module comprising a plurality of motor estimation modules adapted to estimate parameters of an electric motor based on input parameters, which are at least partially different for each of the plurality of motor estimation modules.

51. The motor analysis device as recited in claim 50, wherein the plurality of motor estimation modules comprises a single load point motor estimation module adapted to estimate a plurality of electrical parameters of the electric motor based on motor measurements at a single load of the electric motor.

52. The motor analysis device as recited in claim 50, wherein the plurality of motor estimation modules comprises a three load point motor estimation module adapted to estimate a plurality of electrical parameters of the electric motor based on motor measurements at first, second, and third loads of the electric motor.

53. The motor analysis device as recited in claim 50, wherein the plurality of motor estimation modules comprises a baseline and load point motor estimation module adapted to estimate a plurality of electrical parameters of the electric motor based on baseline motor parameters and motor measurements at a desired operating load of the electric motor, wherein the baseline motor parameters comprise a first motor frequency and the desired operating load comprises a second motor frequency different from the first motor frequency.

54. The motor analysis device as recited in claim 50, wherein the plurality of motor estimation modules are adapted to estimate an operational performance parameter of the electric motor based at least partially on the estimated parameters.

55. A method of analyzing a motor having a rotor and a stator, comprising:

providing an instrumentation system with stator resistance data for the motor;

providing the instrumentation system with output speed and electrical input data obtained during operation of the motor at a single load of the motor; and

operating the instrumentation system to establish estimated values of a plurality of electrical parameters of the motor based on the stator resistance data and the electrical input data.

56. The method as recited in claim 55, wherein providing the instrumentation system with output speed and electrical input data comprises obtaining input current, input voltage, frequency, and stator temperature of the motor at the single load.

57. The method as recited in claim 55, further comprising operating the instrumentation system to estimate at least one motor operating performance parameter based on the estimated values and the electrical input data.

58. A method of operating a motor having a rotor and a stator, comprising:

providing an instrumentation system with motor speed and electrical input data obtained during operation of the motor with first, second, and third loads on the motor; and

operating the instrumentation system to establish estimated values of a plurality of electrical parameters of the motor based on the motor speed and electrical input data obtained during operation of the motor with the first, second, and third loads on the motor.

59. The method as recited in claim 58, wherein providing the instrumentation system with motor speed and electrical input data comprises obtaining input current, input voltage, and frequency of the motor at the first, second, and third loads.

60. The method as recited in claim 58, further comprising operating the instrumentation system to estimate at least one motor performance parameter based on the estimated values, the motor speed, and the electrical input data.

61. A method of operating an inverter-driven motor, comprising:

providing an instrumentation system with baseline parameters of the inverter-driven motor at a first frequency;

providing the instrumentation system with electrical input data obtained for the inverter-driven motor operating at a second frequency; and

operating the instrumentation system to establish an estimated operational parameter of the inverter-driven motor based on the baseline parameters and the electrical input data.

62. The method as recited in claim 61, wherein providing the instrumentation system with electrical input data comprises obtaining input current, input voltage, frequency, and temperature of the motor at the desired operating load.

63. The method as recited in claim 61, wherein operating the instrumentation system to establish the estimated operational parameter comprises estimating output speed of the motor.

64. The method as recited in claim 61, wherein operating the instrumentation system to establish the estimated operational parameter comprises estimating torque of the motor.

65. The method as recited in claim 61, wherein operating the instrumentation system to establish the estimated operational parameter comprises estimating output power of the motor.

66. The method as recited in claim 61, wherein operating the instrumentation system to establish the estimated operational parameter comprises estimating efficiency of the motor.

67. The method as recited in claim 61, wherein operating the instrumentation system to establish the estimated operational parameter comprises establishing a core loss resistance at the second frequency as a function of the second frequency and a baseline core loss resistance at the first frequency.